CLAIMS

What is claimed is:

1. A distortion reduction circuit for a device having a receiver, the circuit comprising:

a gain stage having an input coupled to the receiver and an output, the gain stage controlling an amplitude of an output signal related to a second order nonlinear response within the receiver; and

an output coupling circuit to couple the gain stage output to the receiver.

2. The circuit of claim 1, wherein the gain stage controls the amplitude of the output signal based on the amplitude of the second order nonlinear response within the receiver.

3. The circuit of claim 1, further comprising a squaring circuit coupled to the receiver to generate the signal related to the second order nonlinear response within the receiver.

4. The circuit of claim 1, wherein the receiver is a radio frequency (RF) receiver.

5. The circuit of claim 1, for use with the receiver generating a down-converted signal wherein the output coupling circuit is an adder having first and second inputs and an output, the first input configured to receive the down-

converted signal from the receiver and the second input configured to receive the gain stage output signal.

6. The circuit of claim 1, for use with the receiver having a mixer wherein the mixer generates the signal related to the second order nonlinear response within the receiver wherein the gain stage is coupled to an input node of the mixer.

7. The circuit of claim 1, wherein the gain stage generates an output current having a current amplitude related to the second order nonlinear response within the receiver.

8. The circuit of claim 7, for use with the RF receiver generating a down-converted signal wherein the output coupling circuit is a direct connection of the down-converted signal of the receiver.

9. The circuit of claim 1 for use in factory calibration of a wireless communication device containing the receiver wherein the receiver generates a down-converted signal, the receiver being configured to receive an external input signal to permit adjustment of the gain stage to thereby minimize the second order nonlinear response of the down-converted signal.

10. A wireless communication device including a receiver and a distortion reduction circuit, the device comprising:

a gain stage having an input coupled to the receiver and an output, the gain stage controlling an amplitude of an output signal related to a second order nonlinear response within the receiver; and

an output coupling circuit to couple the gain stage output to the receiver.

11. The device of claim 10, the receiver generating a down-converted signal wherein the output coupling circuit is an adder having first and second inputs and an output, the first input configured to receive the down-converted signal from the receiver and the second input configured to receive the gain stage output signal.

12. The device of claim 10, the receiver having a mixer wherein the mixer generates the signal related to the second order nonlinear response within the receiver wherein the gain stage is coupled to an input node of the mixer.

13. The device of claim 10, for use in factory calibration of the wireless communication device wherein the receiver generates a down-converted signal, the receiver being configured to receive an external input signal to permit adjustment of the gain stage to thereby minimize the second order nonlinear response of the down-converted signal.

14. An automatic calibration circuit for a device having a receiver, the circuit comprising:

a signal source to generate a test signal; and

a selectively activated switch circuit to couple the signal source to the receiver input terminal when selectively activated to couple the test signal to the receiver input terminal and thereby permit distortion reduction adjustments on the receiver.

15. The circuit of claim 14, wherein the signal source comprises an internal signal generator.

16. The circuit of claim 15, wherein the internal signal generator generates the test signal having multiple frequency components having a predetermined spectral spacing.

17. The circuit of claim 14, for use in a wireless communication device having a transmitter, the circuit further a transmitter control to control an input signal to the transmitter, the transmitter control being selectively activated during an auto-calibration process to generate the test signal.

18. The circuit of claim 17, further comprising an attenuator coupled to a transmitter output terminal and thereby generate an attenuated output signal, the attenuated output signal being the test signal coupled to the switch circuit.

19. An automatic calibration circuit for distortion reduction in a wireless communication device having a receiver, the circuit comprising:

a signal source to generate a test signal; and

a selectively activated switch circuit to couple the signal source to the receiver input terminal when selectively activated to couple the test signal to the

receiver input terminal and thereby permit distortion reduction adjustments on the receiver.

20. The circuit of claim 19, wherein the signal source comprises an internal signal generator.

21. The circuit of claim 19, for use in a wireless communication device having a transmitter, the circuit further a transmitter control to control an input signal to the transmitter, the transmitter control being selectively activated during an auto-calibration process to generate the test signal.

22. A distortion reduction circuit for a device having a receiver, comprising:

amplitude control means for controlling an amplitude of a signal related to a second order nonlinear response within the receiver; and

coupling means for coupling the signal to the receiver to reduce the second order nonlinear response of the receiver.

23. The circuit of claim 22, further comprising squaring means for generating the signal related to the second order nonlinear response of the receiver.

24. The circuit of claim 22, for use with a receiver having a mixer wherein the mixer generates the signal related to the second order nonlinear response within the receiver, the amplitude control means being coupled to an input of the mixer.

25. The circuit of claim 22, wherein the coupling means comprises an adder having first and second inputs and an output, the first input configured to receive an output signal from the receiver and the second input configured to receive the output of the amplitude control means.

26. The circuit of claim 22, for use in factory calibration of the receiver wherein the receiver generates a down-converted signal, the receiver being configured to receive an external input signal to permit adjustment of the amplitude control means to thereby minimize the second order nonlinear response of the down-converted signal.

27. The circuit of claim 22, for use in factory calibration of the wireless communication device containing the receiver wherein the receiver generates a down-converted signal, the receiver being configured to receive an external input signal to permit adjustment of the amplitude control means to thereby minimize the second order nonlinear response of the down-converted signal.

28. An automatic calibration circuit for distortion reduction in a device having a receiver, the circuit comprising:

signal means for generating a test signal; and

switch means for selectively coupling the test signal to a receiver input terminal when selectively activated to thereby permit distortion reduction adjustments on the receiver.

29. The circuit of claim 28, wherein the signal means comprises an internal signal generator to generate the test signal.

30. The circuit of claim 28, for use in a wireless communication device having a transmitter, the circuit further comprising control means, selectively activated during an auto-calibration process, to permit the transmitter to generate the test signal.

31. A method for distortion reduction for a device having a receiver, comprising:

controlling an amplitude of a signal related to a second order nonlinear response within the receiver; and

coupling the signal to the receiver to reduce the second order nonlinear response of the receiver.

32. The method of claim 31, further comprising squaring an input signal to generate the signal related to the second order nonlinear response of the receiver.

33. The method of claim 31, wherein coupling the signal comprises adding an output signal from the receiver and the signal related to the second order nonlinear response within the receiver.

34. The method of claim 31, for use with a receiver having a mixer wherein the mixer generates the signal related to the second order nonlinear response within the receiver and controlling the amplitude of the signal comprises controlling the amplitude of the signal from the mixer.

35. The method of claim 31, for use in factory calibration of the receiver wherein the receiver generates a down-converted signal, the method further

comprising coupling an external signal to the receiver to permit controlling the amplitude of the signal to thereby minimize the second order nonlinear response of the down-converted signal.

36. The method of claim 31, for use in factory calibration of the wireless communication device containing the receiver wherein the receiver generates a down-converted signal, the method further comprising coupling an external signal to the receiver to permit controlling the amplitude of the signal to thereby minimize the second order nonlinear response of the down-converted signal.

37. A method for distortion reduction in a wireless communication device having a receiver, comprising:

controlling an amplitude of a signal related to a second order nonlinear response within the receiver; and

coupling the signal to the receiver to reduce the second order nonlinear response of the receiver.

38. The method of claim 37, wherein the receiver is a radio frequency (RF) receiver.

39. The method of claim 37, further comprising squaring an input signal to generate the signal related to the second order nonlinear response of the receiver.

40. The method of claim 37, for use with a receiver having a mixer wherein the mixer generates the signal related to the second order nonlinear

response within the receiver and controlling the amplitude of the signal comprises controlling the amplitude of the signal from the mixer.

41. The method of claim 37, for use in factory calibration of the wireless communication device containing the receiver wherein the receiver generates a down-converted signal, the method further comprising coupling an external signal to the receiver to permit controlling the amplitude of the signal to thereby minimize the second order nonlinear response of the down-converted signal.

42. A method for automatic calibration to distortion reduction for a device having a receiver, comprising:

generating a test signal; and

selectively coupling the test signal to a receiver input terminal when selectively activated to thereby permit distortion reduction adjustments on the receiver.

43. The method of claim 42, wherein generating the test signal comprises generating a test signal having multiple frequency components having a predetermined spectral spacing.

44. The method of claim 42, wherein generating the test signal comprises generating the test signal using an internal signal generator within the wireless communication device.

45. The method of claim 42, for use in a wireless communication device having an RF transmitter, the method further comprising controlling an input

signal to the transmitter during an auto-calibration process to permit the transmitter to generate the test signal.

46. A method for automatic calibration to distortion reduction of a wireless communication device having a receiver, comprising:

generating a test signal; and

selectively coupling the test signal to a receiver input terminal when selectively activated to thereby permit distortion reduction adjustments on the receiver.